NEC
1122B
TIMS

MODEL 1122B
TRANSMISSION TEST SET

INSTALLATION AND OPERATION

Northeast Electronics Instruction Manual
A1122-20-600 Issue 1 December 1986

northeast electronics
DIVISION OF tau-tron inc.
A UNIT OF GENERAL SIGNAL

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TRANSMISSION TEST SET

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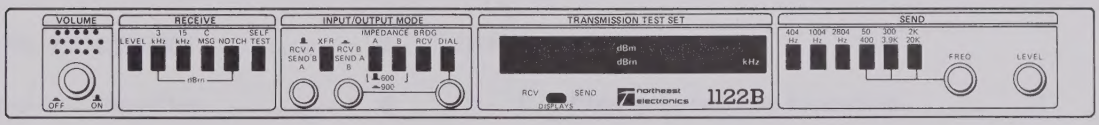

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1122B TRANSMISSION TEST SET AND 1122B-03 REMOTE DISPLAY

OPERATION

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1. GENERAL

1.01 This section describes the functions and operating procedures of the Model 1122B Transmission Test Set and the 1122-03 Remote Display.

1.02 User's questions or comments regarding the scope, accuracy, or presentation of this section will be welcomed by the publisher. All will receive

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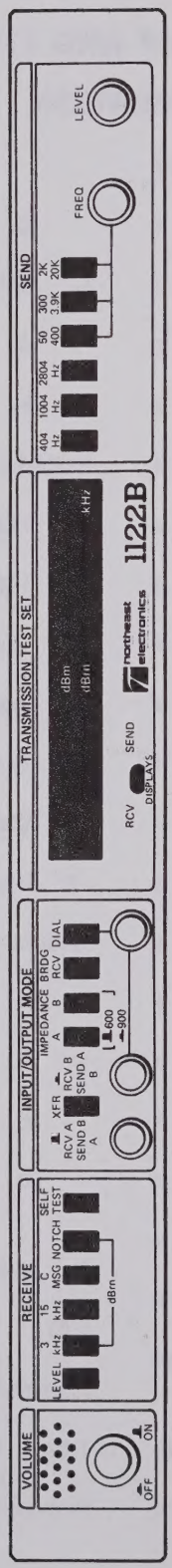


Fig. 1—1122B Transmission Test Set

thorough evaluation. When appropriate, prompt replies will be made. Address correspondence to:

Publications Manager
Northeast Electronics
P.O. Box 2021
Concord, New Hampshire 03301

1.03 The Model 1122B Transmission Test Set (Fig. 1) measures transmission level, signal frequency and noise at voice-frequency test points in telephone transmission facilities. The test set includes a signal source to generate test tones. The 1122B is designed to be rack-mounted for use as a permanent test facility and is equipped to drive up to six remote displays which produce readouts of the instrument receive measurements and the oscillator output. The 1122B-03 Remote Display (Fig. 2) is designed to be aisle-mounted.

2. FUNCTION

A. Transmission Level Measurement

2.01 The 1122B measures transmission levels from −49.9 dBm to +10.4 dBm at frequencies between 50 Hz and 20 kHz. Level measurements are displayed to three digits with a 0.1 dB resolution. The last display segment to the left indicates a minus (−) sign when the measurement falls below 0.0 dBm. No sign appears if the measurement is 0.0 dBm or greater. Measurements can be bridged or terminated in either 600 or 900 ohms. If measurements fall below the measurement range, the display reads Ur (under range). If measurements exceed the range, the display reads Or (over range).

Fig. 2—1122B-03 Remote Display

B. Frequency Measurement

2.02 The 1122B measures and displays frequency whenever the level measurement mode is selected. The test set is capable of measuring frequencies between 50 Hz and 20 kHz at signal levels between −49.9 dBm and +10.4 dBm. Frequency measurements are displayed to four digits with 1 Hz resolution when frequency is below 10 kHz and with

10 Hz resolution when frequency is above 10 kHz. Measurements can be bridged or terminated. When frequency either falls below the measurement range or exceeds it, the frequency display segments read either LO or HI depending on the direction of the out-of-range condition.

C. Noise Measurement

2.03 The 1122B has two noise measurement modes: idle-channel noise and notched noise. The test set measures noise between 10 dBrn and 100 dBrn over the frequency range of 50 Hz and 20 kHz. Measurements are displayed to three digits with 1 dB resolution. Measurements can be bridged or terminated in either 600 or 900 ohms.

Idle-Channel Noise

2.04 Idle-channel noise is measured through any of three built-in weighting networks. Pushbutton switches select C-message, 3-kHz flat, or 15-kHz flat weighting. When C-message is selected, the measurement is displayed in dBrnC. All other noise measurements are displayed in dBrn.

Notched Noise

2.05 The test set is equipped with a 1010-Hz notch filter for making notched-noise (noise-with-tone) measurements. Notched-noise measurements are made in conjunction with one of the three noise weighting networks.

D. Signal Source

2.06 The 1122B signal source is a tunable oscillator that covers the voice-frequency band in three overlapping ranges. These ranges are from 50 Hz to 400 Hz, from 300 Hz to 3.9 kHz, and from 2 kHz to 20 kHz. Frequency is varied within these ranges by a rotary control. Three fixed frequencies may be selected by pushbutton switches. They are 404 Hz, 1004 Hz, and 2804 Hz.

E. Input/Output Connections

2.07 Two input/output jacks designated A and B are used for signal input and oscillator output. In addition to these front-panel jacks, a rear-panel terminal strip may be used for semi-permanent connection into the test set input/output circuits (see Fig. 3). The rear-panel terminals are designated tip, ring, and sleeve (T, R, and S) for both the A and the B input/output circuits. These terminals are automatically disconnected from their associated circuit when a plug is inserted into the jack (Fig. 4). A front-panel switch controls transmit and receive directions for the A and B circuits. Either circuit may be used for transmitting or receiving, allowing the test set to simultaneously make measurements over one circuit and send tone over the other.

F. Dialing Capability

2.08 The 1122B is equipped for dialing-out on circuits connected to the input/output jack. The DIAL jack allows an external dialer or telephone set to be cut-through to the circuit when the DIAL pushbutton is selected. Once the dialed connection has been made, disengage the DIAL switch to hold the connection and to disconnect the dialer from the circuit.

G. Speaker/Monitor

2.09 A speaker allows audible monitoring of the received or transmitted signal. The speaker is switched between the receive and transmit by the display RCV/SEND switch. Speaker volume is controlled by a front-panel rotary control.

H. Power Sources and Fusing

2.10 The 1122B test set operates from either −48 volt battery of a 115-volt ac power source. It requires a 1/4 A slow-blow fuse which is located on the rear panel. To replace fuse, push fuseholder and rotate in the direction of the arrow marked on the holder.

2.11 The remote display operates from a filtered −48 V dc power source. It requires a 1/4 A fast-blow fuse. To replace the fuse, remove display front cover. The fuse is located on the component side of the circuit board. Clips on the board allow storage for two spare fuses.

I. Self Test Routine

2.12 Microprocessors enable the test set to make internal tests of its measuring circuitry. When the operator initiates the test routine, the microprocessor automatically tests all display segments and the major circuits. Display messages indicate the result of each test. A FAIL message indicates the need for calibration or repair. The self test should be performed each time the test set is turned on for use.

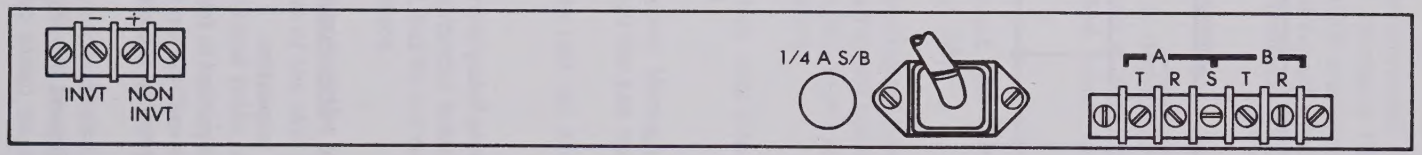


Fig. 3—Test Set Rear Panel

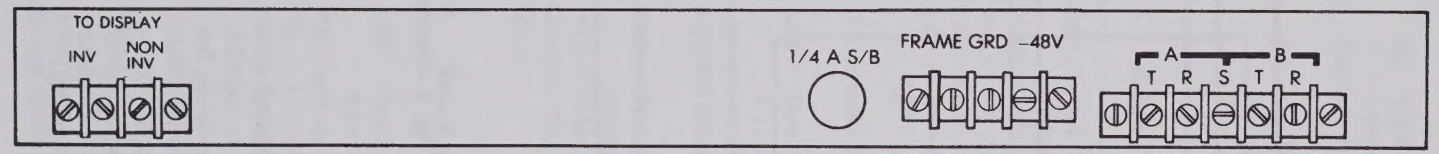


Fig. 3A—Test Set Rear Panel (dc)
1122B-L2A

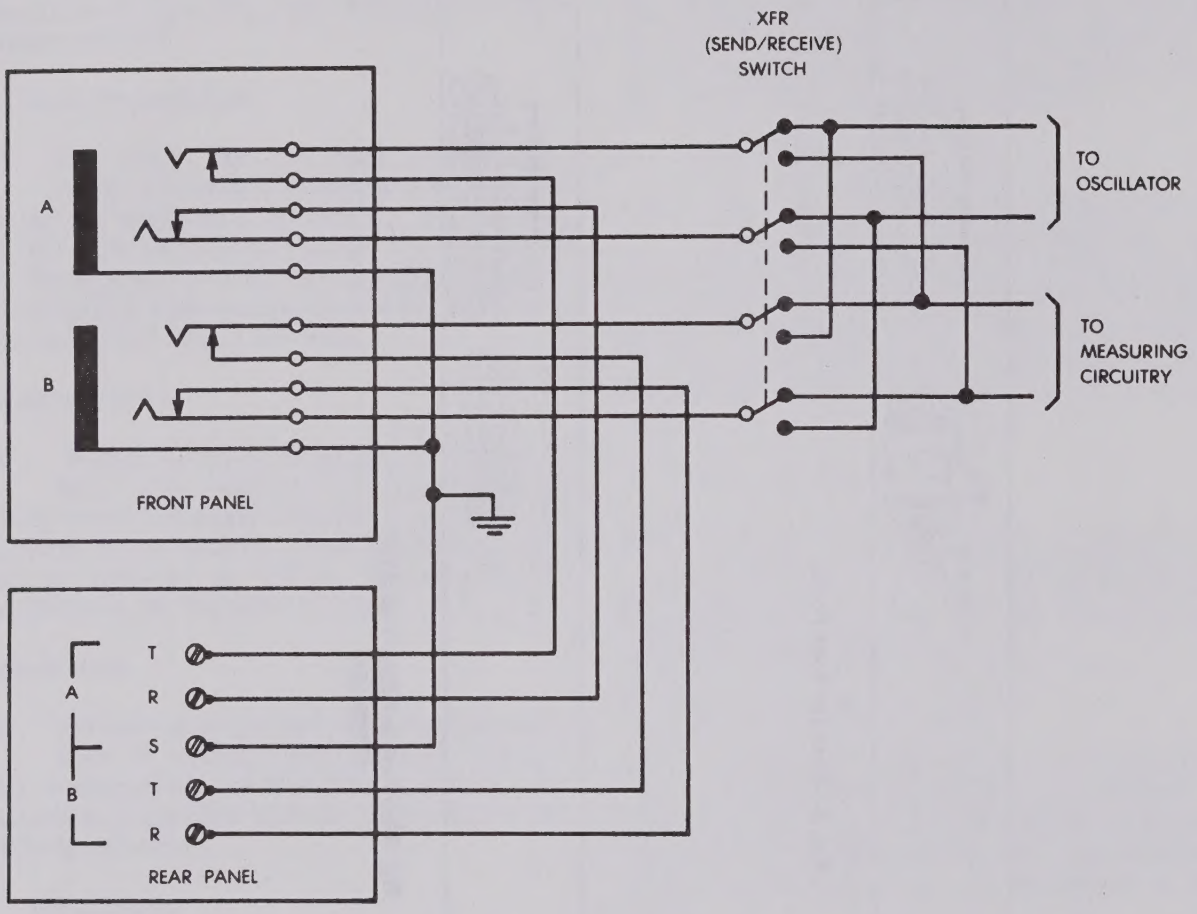


Fig. 4—Input/Output Circuits

J. Remote Display

2.13 The 1122B test set is capable of driving up to six remote displays connected in parallel. The microprocessor-controlled display produces frequency and noise or level readouts of the transmitted or received signal. When power is first applied to the display, all display segments light momentarily, showing all eights. This allows the operator to ensure that all display segments are operating properly.

3. PRE-OPERATION PROCEDURES

A. Unpacking and Inspection

3.01 The test set is packed in foam-filled cardboard cartons. Open each carton and remove the top portion of the foam packing material. Lift equipment out.

3.02 Inspect equipment for any signs of physical damage such as dents or distortion in the

instrument housing. Inspect the front-panel controls and pushbuttons for damage. Inspect rear panel for damage.

3.03 Should inspection reveal any physical damage, contact the Northeast Electronics Customer Service Department for instructions. Retain packing materials, ***but do not repack or attempt to return the equipment without instructions to do so.***

B. Instrument Mounting

3.04 The 1122B is designed to be rack-mounted and is shipped with either 19-inch or 23-inch brackets as specified when the instrument was ordered.

(a) To rack mount the test set with 19-inch brackets (Fig. 5A):

(1) Remove front-panel screws. Disengage the front panel/circuit board assembly from its rear connector, but do not remove the assembly from the enclosure.

(2) Slide the hex nuts into the grooves of the side panel.

(3) Insert screws through the holes of the bracket into the hex nuts.

(b) To mount the test set with 23-inch brackets (Fig. 5B).

(1) Remove front-panel screws. Disengage the front panel/circuit board assembly from its rear connector, but do not remove the assembly from the enclosure.

(2) Slide the heads of the hexhead screws into the grooves of the side panels.

(3) Place the round holes of the brackets over the screws.

(c) To position brackets on either set:

(1) For projected mounting, slide brackets five inches (12.70 cm) back from the front edge of the unit.

(2) For flush mounting, slide brackets forward until they are even with the front edge of the unit.

(d) Tighten screws on 19-inch bracket or secure screws with KEP nuts on 23-inch bracket. Replace front panel/circuit board.

(e) Position assembly in rack and secure with screws inserted through the elongated holes of the brackets.

C. Display Mounting

3.05 Mount display bracket to 5/8″ rod (Fig. 7). The rod and all other mounting hardware must be supplied by the operating company. Recommended height for mounting the display is 9 feet. Display characters can be read from a distance of 40 feet or more.

D. Power Connections

3.06 Power connections to the test set are made to a recessed 3-prong male plug. Connect the test set to 115-volt ac power using the power cord supplied with the test set.

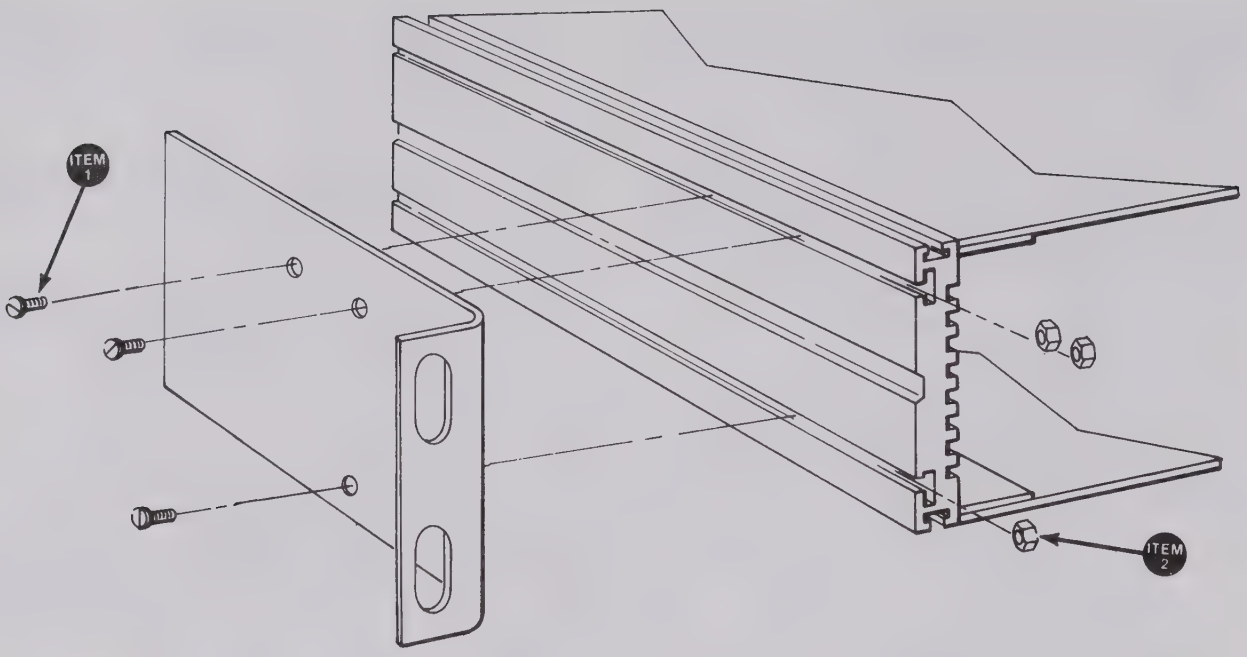
3.07 Power connections to the display are made to terminals on the rear panel. Connect the −48 V dc battery lead to the terminal marked −48 V. Connect the ground lead to the terminal marked GRD.

E. Rear-Panel Input/Output Connections

3.08 Semi-permanent connections into the instrument input/output circuitry can be made to terminals on the rear panel. Terminals are shown in Fig. 3. Connect tip, ring, and sleeve leads to the terminals designated T, R, and S, respectively.

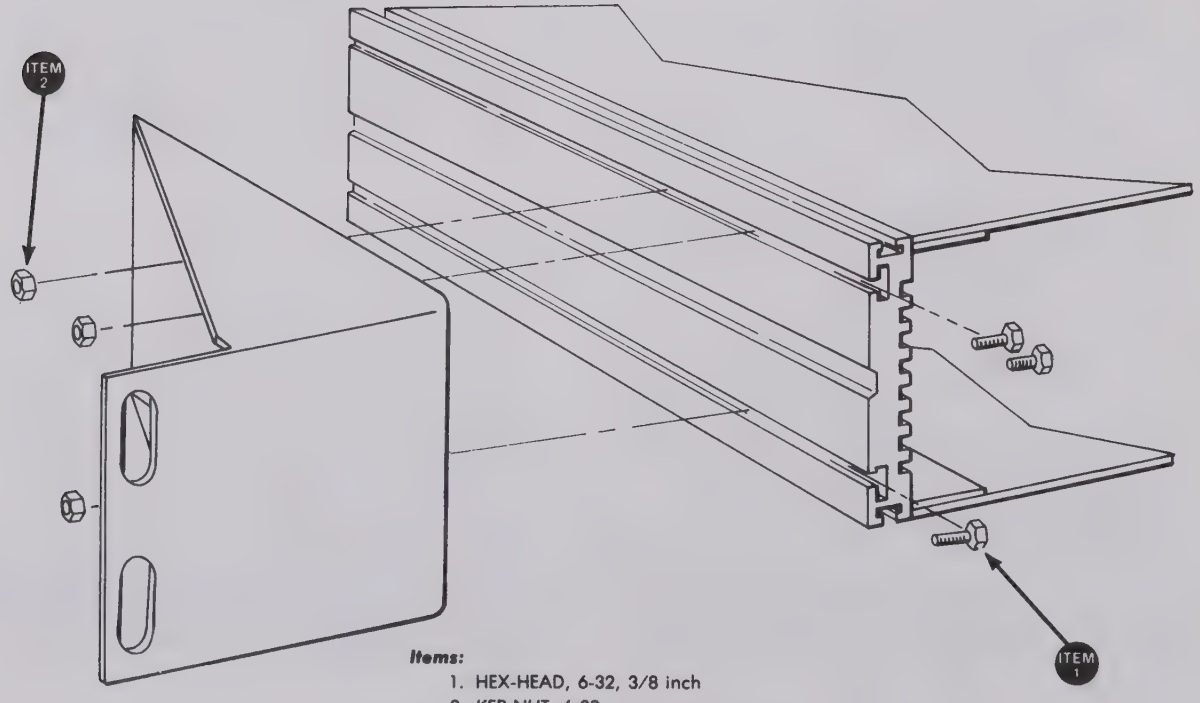
F. Display Connections

3.09 Use 24 AWG twisted pairs for these connections. Maximum number of displays is six. Maximum distance between test set and last display in the line-up is 600 feet.



Items:
1. FLAT HEAD SCREWS, 6-32 x ¼ inch
2. HEX NUTS, 6-32

Fig. 5-A—19-inch Test Set Rack Mounting



Items:
1. HEX-HEAD, 6-32, 3/8 inch
2. KEP NUT, 6-32

Fig. 5-B—23-inch Test Set Rack Mounting

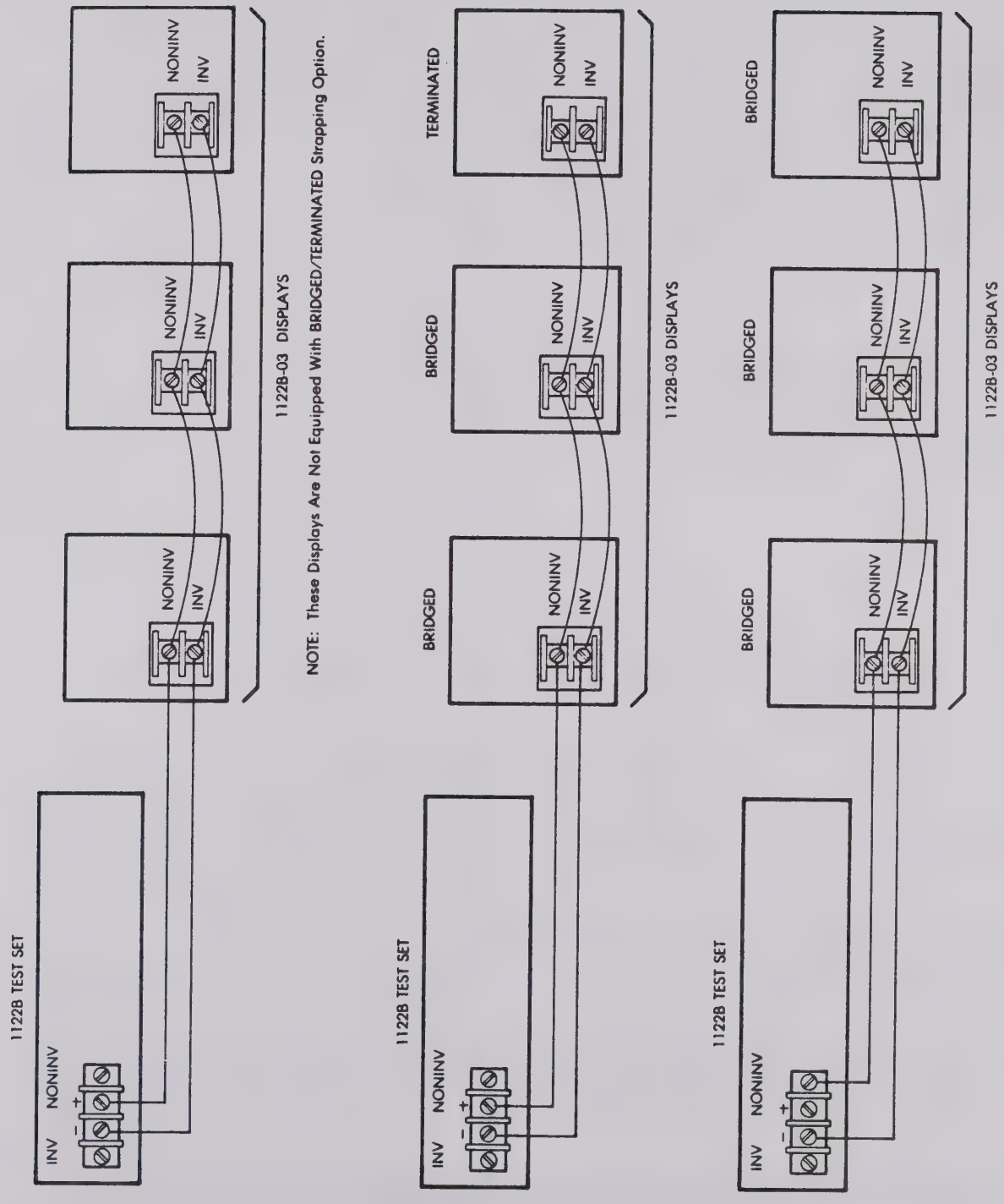
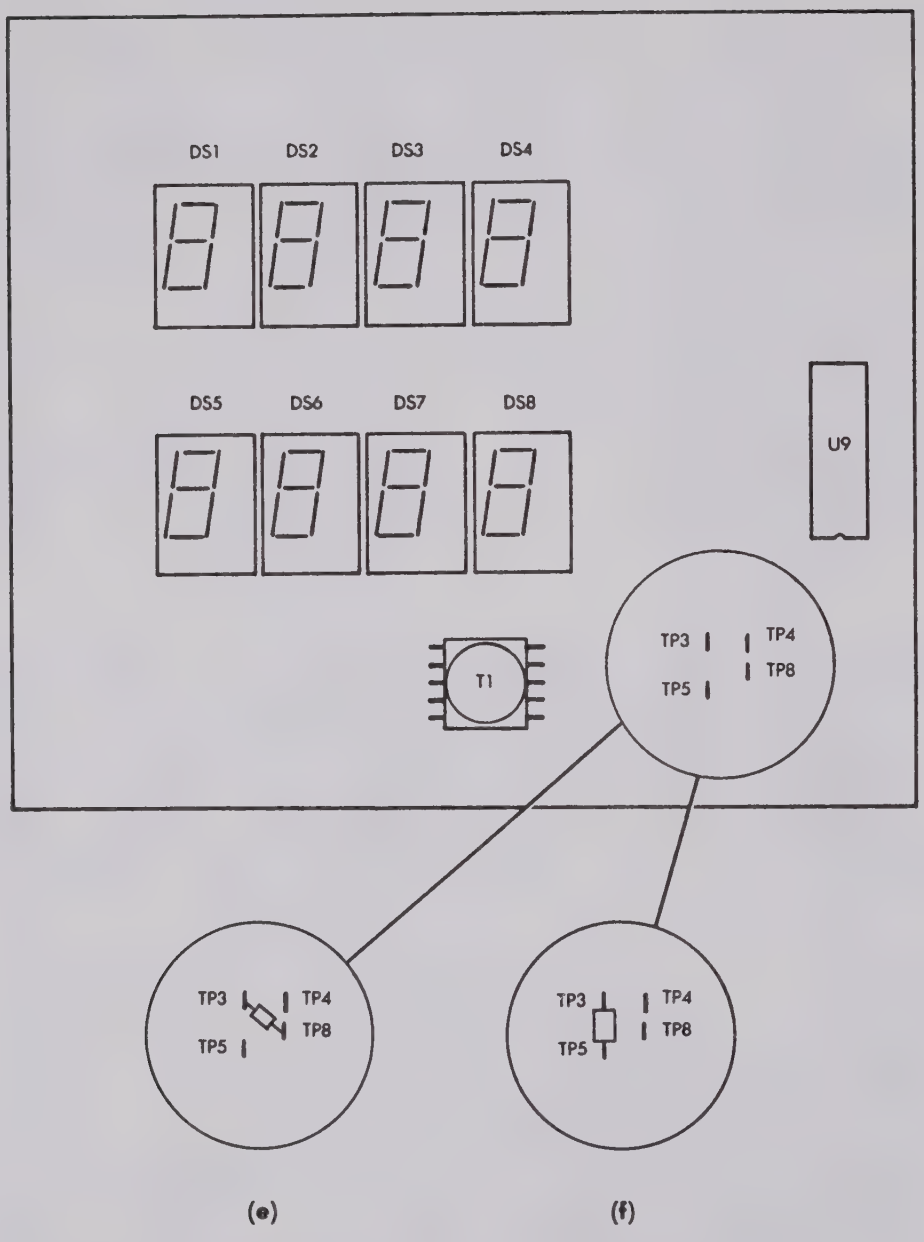


Fig. 6—Display Connection. (a) For Procedure A, (b) for Procedure B, and (c) for Procedure C. (Sheet 1 of 2).

(d)



(e) (f)

Note: Displays with serial number 600 and above have a bridge-terminate switch on back of the unit.

Fig. 6—Display Connection. (d) Location of TP3, TP5, and TP8 for strapping option, (e) location of resistor for TERMINATED display, and (f) location of resistor for BRIDGED display. (Sheet 2 of 2).

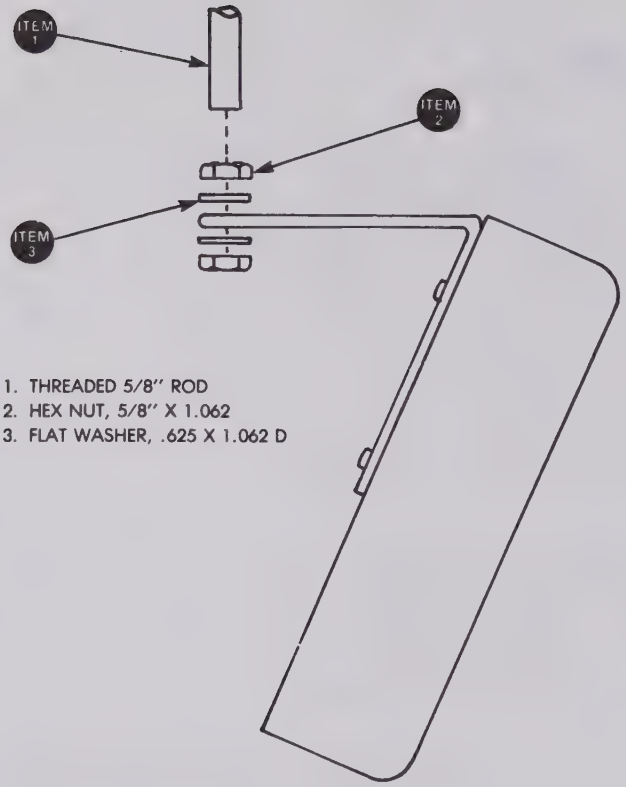


Fig. 7—Display Mounting

3.10 Examine the manufacturer's label affixed to the rear panels of the test set and displays. Note the serial number of each, then refer to Table A to determine which procedure to use for display connection. Remove power from test set and displays before working on connections or internal strapping. The connection procedures are as follows:

(a) ***Procedure A (Fig. 6a):*** Connect NONINV test set terminal to NONINV display terminal. Connect INV test set terminal to INV display terminal. Connect subsequent displays in parallel.

Note: Displays with serial number 600 and above use switch on back of unit to make option selection. No internal strapping is required.

(b) ***Procedure B (Fig. 6b):*** Each display has a label on the rear panel describing which strapping option is in place. The final display should be strapped and marked TERMINATED and all others should be strapped and marked BRIDGED. (Displays received from the manufacturer are TERMINATED and so marked.) To change the strapping option, remove power from display. Remove front panel of display. Locate terminals TP3, TP5, and TP8 at the lower right corner of board (Fig. 6d). Remove the 1 kohm terminating resistor connected between two of these points. For a TERMINATED display, reinstall the 1 kohm terminating resistor between TP3 and TP8 (Fig. 6e). For a BRIDGED display, reinstall the 1 kohm terminating resistor between TP3 and TP5 (Fig. 6f). Mark strapping option on label on rear panel. Replace front cover. Connect display(s) as in Procedure A, using BRIDGED displays for all but the final TERMINATED display.

(c) ***Procedure C (Fig. 6c):*** Check rear panel of display(s) to determine that all are BRIDGED. If any are TERMINATED, modify them as explained in Procedure B above. Connect displays as shown in Fig. 6c. Note that the unmarked terminal on the display output terminal block connects to the NONINV display terminal and acts as a ground lug.

4. OPERATION

A. Front-Panel Controls, Indicators, and Jacks

4.01 The front panel of the 1122B Test Set is divided into the following functional areas (Fig. 1).

(a) ***VOLUME***: Control for speaker volume and power to test set is contained in this area.

(b) ***RECEIVE***: Controls select level and frequency measurement mode, two noise measurement modes, and three noise weighting networks. Pushbutton initiates self test routine.

(c) ***INPUT/OUTPUT MODE***: Controls select transmit and receive directions for both input/output jacks, bridged or terminated mode in the receive direction, and dialing capability.

(d) ***DISPLAY***: Section contains noise/level and frequency displays. Pushbutton control selects transmit or receive signal for display and speaker monitoring.

(e) ***SEND***: Control selects level and frequency of tone to be transmitted over the circuit to be tested.

The controls, switches, displays, and jacks of each functional area and their use are described in Table B.

TABLE A
DISPLAY CONNECTION PROCEDURE

1122B TEST SET SERIAL NUMBER	1122B-03 DISPLAY SERIAL NUMBER	DISPLAY CONNECTION PROCEDURE
236 - 364	101 - 184	A
	185 and above	C
365 and above	101 - 184	NOTE 2
	185 and above	B

NOTES:

1. Displays with serial number 185 and above must not be intermixed with displays with serial numbers 101 - 184.

2. These test sets and displays cannot be connected.

B. Self Test Routine

4.02 The self test routine tests four major areas of the test set circuitry and produces display messages indicating the results of each test. These display messages are listed and described in Table C. When the test routine has been successfully completed, the display reads PASS ALL and the test set is ready for operation. If the test set fails any of the tests, the routine will stop at that point and a FAIL message appears on the displays. In this event, arrangements for repair should be made.

> *Note*: A SEND OFF, PUSH LEVL, or PUSH 1004 message appears on the displays when the instrument has not been properly set up for the self test function. If SEND OFF appears, set RCV/SEND switch to RCV. If PUSH LEVL appears, push the LEVEL switch. If PUSH 1004 appears, push the 1004 Hz switch. Testing continues when instrument setup is corrected.

4.03 ***Continued Use After Failure (Table D)***: Some functions may remain useable even after a self test failure. If the decision is made to use the test set after a self test failure, the accuracy of these remaining functions should be verified by comparison to a known good instrument. To reset self test circuitry, turn power OFF, then back ON.

4.04 The self test routine should be initiated each time test set is turned on for operation. To initiate the routine:

(a) Turn the instrument ON by pulling the volume/power switch out.

(b) Set the DISPLAYS RCV/SEND switch to RCV.

(c) Select the 1004 Hz pushbutton in the SEND section.

(d) Select the LEVEL pushbutton in the RECEIVE section.

(e) Select the TEST switch.

(f) When test sequence is complete, push TEST again to release the switch.

C. Operating Procedures

4.05 These operating procedures are divided into four classifications:

- Send Tone
- Receive Measurements
- Simultaneous Send and Receive
- Dialing

TABLE B
1122B FRONT PANEL CONTROLS

TEST	DISPLAY MESSAGE OR INDICATION	ACTION
Displays	Left-Hand Display	Displays measurements for noise and level. Consists of four, seven segment LED display characters with decimal point. Ur indication for under range and Or indication for over range condition.
	Right-Hand Display	Displays measurements for frequency. Consists of four, seven-segment LED display characters with decimal point. Display reads HI or LO when out-of-range condition is encountered.
	Unit-of-Measurement Indicator	Decimal point of last display character of left-hand display lights in front of dBrn designation when noise measurement is made. When level measurement is made, no indicator lights and the dBm designation should be applied to the displayed value.
	RCV/SEND Switch	Toggle switch determines whether the received or transmitted signal measurements are displayed and whether the received or transmitted signal is monitored on the speaker.
Volume Control Section		Rotating switch controls speaker volume. Push and pull controls power to the test set. Power is OFF when switch is IN. Power is ON when switch is OUT.
SEND Section	50-400 Hz Switch	Locking pushbutton switch selects an output frequency range of 50 Hz to 400 Hz.
	300-3.9 K Switch	Locking pushbutton switch selects an output frequency range of 300 Hz to 3.9 Hz.
	2 K-20 K Switch	Locking pushbutton switch selects an output frequency range of 2 kHz to 20 kHz.
	FREQ Control	Rotary control varies output frequency within the three ranges selected by pushbutton switches described above: 50-400, 300-3.9 K, and 2 K-20 K.
	404 Hz Switch	Locking pushbutton switch selects a fixed output frequency of 404 Hz.
	1004 Hz Switch	Locking pushbutton switch selects a fixed output frequency of 1004 Hz.
	2804 Hz Switch	Locking pushbutton switch selects a fixed output frequency of 2804 Hz.
	LEVEL Control	Rotary control varies output signal level over the −40 to +10 dBm range.

TABLE B (CONT'D)
1122B FRONT PANEL CONTROLS

TEST	DISPLAY MESSAGE OR INDICATION	ACTION
INPUT/OUTPUT MODE Section	A Jack	Accepts 310-type plug. Used to connect circuit to be tested to test set.
	B Jack	Accepts 310-type plug. Used to connect circuit to be tested to test set.
	XFR Switch	Selects transmit and receive directions for the circuits connected to the A and B jacks.
	BRGD RCV Switch	Selects bridged or terminated measurement mode for received signal.
	A Switch	Pushbutton switch selects terminating impedance for circuit connected to A jack. When switch is IN, 900 ohm impedance is selected. When switch is OUT, 600 ohm impedance is selected.
	B Switch	Pushbutton switch selects terminating impedance for circuit connected to B jack. When switch is IN, 900 ohm impedance is selected. When switch is OUT, 600 ohm impedance is selected.
	DIAL Jack	Accepts 310-type plug. Used to connect external dialer or telephone set to circuit connected to the B jack.
	DIAL Switch	Locking pushbutton switch cuts dialer through to circuit to be dialed over.
RECEIVE Section	TEST Switch	Locking pushbutton switch initiates self-test routine.
	LEVEL Switch	Locking pushbutton switch selects the level-measurement mode.
	3 kHz Switch	Locking pushbutton switch selects the noise-measurement mode with 3 kHz flat noise weighting.
	15 kHz Switch	Locking pushbutton switch selects the noise-measurement mode with 15 kHz flat noise weighting.
	CMSG Switch	Locking pushbutton switch selects noise-measurement mode with C-message noise weighting.
	NOTCH Switch	Locking pushbutton switch selects the 1004 Hz notch filter for use with one of the three weighting networks.

TABLE C
SELF TEST ROUTINE DISPLAY MESSAGES

TEST	DISPLAY MESSAGE OR INDICATION	ACTION
DISPLAY TEST	All segments light, segments show all 8's and decimal points.	None
	Some segments, numerals, decimals not lighting.	Arrange for repair.
LOG CONVERTER TEST	PASS LC	None
	FAIL LC	Arrange for repair.
INSTRUMENT SET UP	SEND OFF	Set RCV/SEND switch to RCV; self test continues.
	PUSH LEVL	Push LEVEL switch; self test continues.
	PUSH 1004	Push 1004 Hz switch; self test continues.
ANALOG CIRCUITRY TEST	PASS ANLG	None
	FAIL ANLG	Arrange for repair.
DIGITAL CIRCUITRY TEST	PASS ALL	Test set is ready for operation.
	FAIL d	Arrange for repair.

Send Tone

4.06 To send tone, proceed as follows:

(a) Connect the circuit to either the A or B jack.

(b) Set the XFR switch to SEND on the jack chosen in (a).

(c) Set the DISPLAYS switch to SEND.

(d) Set the appropriate circuit impedance (600 or 900 ohms) using the pushbutton switch for the jack chosen in (a).

(e) Set the tone frequency by either:

(1) Selecting one of the three fixed-frequency pushbuttons, or

(2) Selecting one of the three frequency-band pushbuttons and using the FREQ control to adjust to the correct frequency as indicated on the display.

(f) Set the tone level by adjusting the LEVEL control to the correct value as indicated on the display.

Note: The level reading on the display shows the power that would be delivered to a precisely matched termination. For example, if the test set termination is set to 600 ohms and the output level to 0.0 dBm, 1 mW will be delivered to a 600 ohm circuit. The display does not account for impedance mismatch between the circuit and the test set.

Receive Measurements

4.07 To make receive measurements, proceed as follows:

TABLE D
CONTINUED USE OF THE 1122B TRANSMISSION TEST SET
AFTER SELF TEST FAILURE

TEST FAILURE	POSSIBLE FUNCTIONS REMAINING
Display Segments	All functions. Beware of incorrect readings due to missing segments, numerals, or decimal points.
Log Converter Test	Signal Source Frequency Measurement
Analog Test	Signal Source Frequency Measurement Noise and Level Measurement
Digital Test	

(a) Connect the circuit to be tested to either the A or B jack.

(b) Set the DISPLAY switch to RCV.

(c) Set the XFR switch to RCV for the jack chosen in (a).

(d) For bridged measurement, select the BRDG RCV switch.

(e) For terminated measurement, select the proper impedance (600 or 900 ohms) using the pushbutton for the jack chosen in (a).

Note: If switch is set to the BRDG RCV position, the impedance setting has no effect on the value of the level measured, although the display shows the level referenced to the impedance setting.

(f) Select the appropriate RECEIVE switch:

(1) ***LEVEL***: Transmission level and frequency measurement.

(2) ***3 kHz***: Noise measurement with 3-kHz flat weighting.

(3) ***15 kHz***: Noise measurement with 15-kHz flat weighting.

(4) ***CMSG***: Noise measurement with C-message weighting.

(5) ***NOTCH***: Notched noise measurement. This switch must be used in conjunction with one of the three noise weighting networks.

(g) Read measurement from the displays.

Note: If LEVEL is selected in (f), apply the dBm designation to the measurement shown on the right-hand display. If one of the noise measurement modes is selected in (f), the decimal point of the last display character lights in front of the dBrn designation, indicating that dBrn should be applied to the measurement.

Simultaneous Send and Receive

4.08 To simultaneously send tone and make receive measurements, proceed as follows:

(a) Connect circuits to both A and B jacks.

(b) Select the desired transmit characteristics using the SEND section controls (see 4.06).

(c) Select the desired measurement characteristics using the RECEIVE section controls (see 4.07).

(d) Set XFR switch to RCV for the jack on which measurements are to be made. Rocker switch automatically selects SEND mode on jack to be used for sending tone.

(e) For bridged measurements, push BRDG RCV.

(f) For terminated measurement, select the proper impedance (600 or 900 ohms) using the pushbutton for the A and B jacks.

(g) If required, reverse direction of transmission/measurement by selecting receive measurement mode on other circuit. Ensure that termination selected is appropriate for the circuit connected to the jacks.

Dialing

4.09 To use a dialer or telephone set to dial-up a connection over a circuit, proceed as follows:

(a) Connect dialer or telephone set to the DIAL jack.

(b) Connect the circuit over which dialing is to be done to the B jack.

(c) Set XFR switch to RCV B. Push BRDG RCV switch.

(d) Push DIAL switch.

(e) Dial the connection.

Note: Test set automatically holds connection while tests are made.

(f) To disconnect dialer and to drop the connection, release the DIAL switch.

5. SPECIFICATIONS

A. Test Set

5.01 ***Level Measurements***

Range..... – 49.9 to + 10.4 dBm

Frequency..... 50 Hz to 20 kHz

Resolution..... 0.1 dB

Input Impedance..... 600 ohms
900 ohms
Bridging

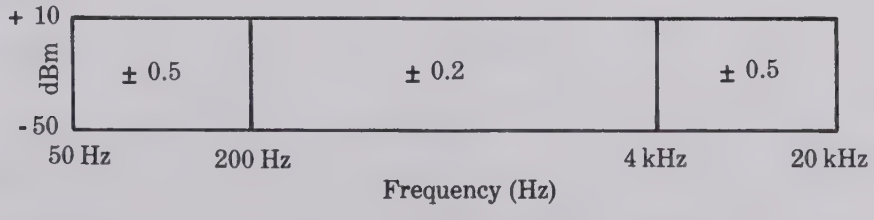
Longitudinal Balance..... 80 dB minimum at 60 Hz

Accuracy

1004 Hz..... 0.1 dB

All other frequencies and levels:

LEVEL ACCURACY



Temperature Coefficient..... ± 0.005 dB/°C (0° to 50°C)

5.02 ***Noise Measurements:***

Range.....10 to 100 dBrn

Frequency.....50 Hz to 20 kHz

Resolution.....1 dB

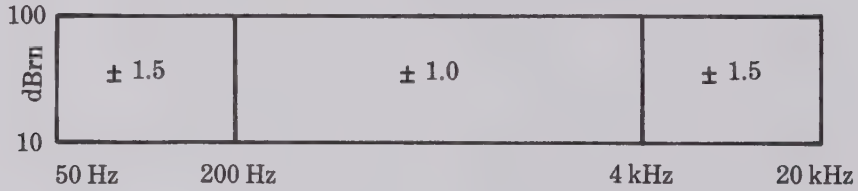
Input Impedance.....600 ohms
900 ohms
Bridging

Longitudinal Balance.....80 dB minimum at 60 Hz

Weighting.....C-message
3-kHz flat
15-kHz flat

Crest Factor.....10 dB minimum below 90 dBrn

NOISE ACCURACY



Frequency

5.03 ***Frequency Measurements:***

Range.....50 Hz to 20 kHz

Level..... −40 to +10 dBm

Resolution.....1 Hz below 10 kHz
10 Hz above 10 kHz

Accuracy.....1 Hz

5.04 ***Transmitter:***

Output Level.....– 40 to + 10 dBm

Output Frequency

Low Band.....50 Hz to 400 Hz

Middle Band.....300 Hz to 3.9 kHz

High Band.....2 kHz to 20 kHz

Fixed.....404 Hz
1004 Hz
2804 Hz

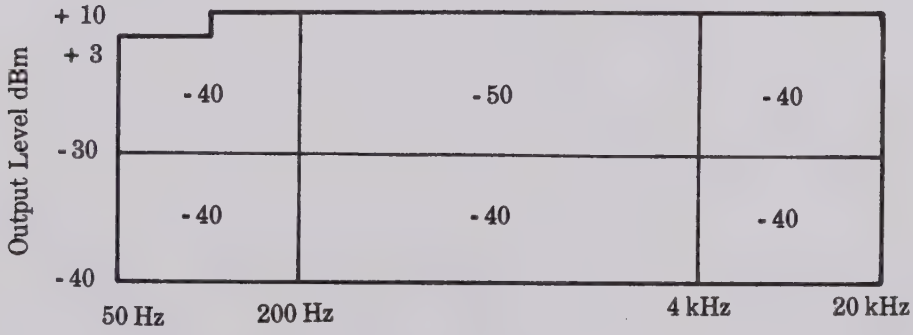
Output Impedance.....600 ohms (balanced)
900 ohms (balanced)

Total Distortion

1004 Hz.....– 60 dB or better above – 20 dBm

All other frequencies and levels:

TOTAL DISTORTION



5.05 ***Power Supply:***

Power Consumption.....8 watts

Voltage.....115 V ± 10%, 45 - 400 Hz

5.06 ***Mechanical:***

Height.....1¾ inches (4.5 cm)

Width.....17¼ inches (43.8 cm)

Depth.....10½ inches (26.7 cm)

Weight.....7 lbs. (3.2 kg)

B. Remote Display

5.07 ***Power Characteristics:***

Power Consumption.....4.5 watts

Voltage.....−48 V dc ± 10%

5.08 ***Mechanical:***

Height.....11 inches (27.9 cm)

Width.....11 inches (27.9 cm)

Depth.....1½ inches (3.8 cm)

Weight.....3 lbs (1.4 kg)

WARNING

1. HANDLING STATIC-SENSITIVE DEVICES

1.01 Static-sensitive devices, such as circuit boards, can be adversely affected by static discharge. For example, a person in rubber-soled shoes walking across a tiled floor can produce a static charge of 10,000 volts or more. If he then comes in contact with a static-sensitive device, it can be easily affected, causing equipment failures such as electrical shorts, open circuits, or changes in critical values.

1.02 Since many of our products contain numerous static-sensitive devices, we recommend that several precautions be taken when handling our equipment:

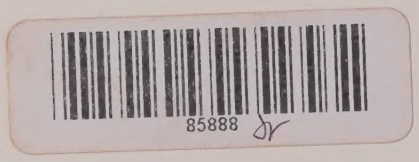
(1) Carpeting on floors produces considerable static discharge, and you should avoid handling circuit boards in these areas.

(2) Handle circuit boards by the edges, being careful not to touch the pins or traces.

(3) When handling individual circuit board assemblies, wear static grounding wrist straps. If you do not have wrist straps, ground yourself by touching a chassis or unpainted rack support. When you are in transit with a board, protect it inside a conductive bag.

(4) If a circuit board must be returned to Northeast Electronics, place it in an antistatic or a conductive bag. Avoid using packing material made of plastics such as polystyrene, polyethylene, or foam. We would be happy to supply you with the recommended bags if they are not available to you.

By following these few precautions, your equipment failures caused by electrostatic discharge will be minimized, and our service to you will be maximized.



northeast electronics
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